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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Osamu Koshiba et al.
Serial No: 09/842,955
Filed: 4/25/2001
Art Unit: 2613
Examiner: V. Le
Docket No.: TI-29265
Conf. No.: 8656
Customer No.: 23494

CERTIFICATION OF FACSIMILE TRANSMISSION

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Gracia Sansom — Gracia Sansom

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FACSIMILE COVER SHEET

X FACSIMILE COVER SHEET (1 SHEET)	___ AMENDMENT
___ NEW APPLICATION	___ EOT
___ DECLARATION	___ NOTICE OF APPEAL
___ ASSIGNMENT	X APPEAL BRIEF (4 Pages)
___ FORMAL DRAWINGS	___ ISSUE FEE
___ INFORMAL DRAWINGS	___ REPLY BRIEF (IN TRIPLICATE)
___ CONTINUATION APP'N	___
___ DIVISIONAL APP'N	

NAME OF INVENTOR(S): Osamu Koshiba et al.	RECEIPT DATE & SERIAL NO.: Serial No.: 09/842,955 Filing Date: 4/25/2001 Conf. No.: 8656
TITLE OF INVENTION: Image Preprocessing	
TI FILE NO.: TI-29265 / DEPOSIT ACCT. NO.: 20-0668	
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appl.No.: 09/842,955
Appellant: Koshiba et al
Filed: April 25, 2001
TC/AU: 2613
Examiner: Le

Confirmation No.: 8656

Docket: TI-29265
Cust.No.: 23494

APPELLANTS' BRIEF

Commissioner for Patents
P.O.Box 1450
Alexandria VA 22313-1450

Sir:

The attached sheets contain the Rule 41.37 items of appellants' brief. The Commissioner is hereby authorized to charge the fee for filing a brief in support of the appeal plus any other necessary fees to the deposit account of Texas Instruments Incorporated, account No. 20-0668. A fee transmittal sheet is enclosed.

Respectfully submitted,

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Rule 41.37(c)(1)(i) Real party of interest

Texas Instruments Incorporated owns the application.

Rule 41.37(c)(1)(ii) Related appeals and interferences

There are no related dispositive appeals or interferences.

Rule 41.37(c)(1)(iii) Status of claims

Claims 1-8 are pending in the application with claims 3-8 allowed and claims 1-2 finally rejected. This appeal involves the finally rejected claims.

Rule 41.37(c)(1)(iv) Status of amendments

There is no amendment after final rejection.

Rule 41.37(c)(1)(v) Summary of claimed subject matter

The invention provides a method of video encoding with motion compensation which includes a preprocessing as follows: for each pixel in an input frame (i) find a motion vector for the block containing the pixel, (ii) compare the prediction error for the pixel using this motion vector to a threshold, and (iii) when the prediction error is greater than the threshold, lowpass filter at the pixel. This gives a filtered-at-some-pixels version of the input frame, and then apply motion compensation encoding to this filtered version of the input frame. Application Fig.3 illustrates the preprocessing with the pixel-wise filtering in the bottom branch and the output to regular video encoding indicated by the "MPEG encoder" at the upper right. Application page 4 describes the preprocessing in Fig.3 with details as to the various comparisons and thresholds of the preferred embodiment on pages 5-6.

Rule 41.37(c)(1)(vi) Grounds of rejection to be reviewed on appeal

The grounds of rejection to be reviewed on appeal are:

(1) claims 1-2 were rejected as anticipated by the Ueno reference.

Rule 41.37(c)(1)(vii) Arguments

(1) Claims 1-2 were rejected as anticipated by Ueno; the Examiner cited the preprocessor 11 of Ueno Figs.1-2, column 7, lines 13-17 and lines 55 et seq., and standard motion compensation as in MPEG and H.261.

Appellants reply that Ueno indeed performs preprocessing in item 11 of Figs.1-2; but Ueno does not suggest the preprocessing required by claim 1. In particular, motion compensation generally compares blocks of an input frame with shifted (by candidate motion vectors) blocks of a prior frame, and determines the motion vector for a block by minimization of prediction error for the block which typically is the sum over all pixels in the block of the individual prediction errors. Explicitly, for a block of pixels p(j,k) in the current frame, q(m,n) denoting pixels in the prior reference frame, and a vector $\mathbf{v} = (v_x, v_y)$, then the motion vector for the block is found by:

$$\text{motion vector (block)} = \arg\min_{\mathbf{v}} \sum_{p(j,k) \text{ in block}} | p(j,k) - q(j+v_x,k+v_y) |$$

That is, the motion vector relates to the "prediction error" of the block which is the sum of all individual pixel prediction errors. Both Ueno and claim 1 do this. But claim 1, step (b) then compares the prediction error for each individual pixel in the block to a threshold (the "first level"); that is for each (j,k), compare $|p(j,k) - q(j+w_x,k+w_y)|$ to a threshold, where the motion vector for the block is $\mathbf{w} = (w_x,w_y)$. And when the individual pixel has a prediction error greater than the threshold, claim 1, step (c) filters at that pixel. Thus some pixels in a block may have small prediction errors and other pixels in the same block have large prediction errors, so only some pixels may be filtered. And this requires comparison at each pixel.

In contrast, Ueno column 7, lines 13-27 has two approaches: either (i) a lowpass filter which changes from block to block (column 7, lines 17-20) or (ii) adding the frame to the predicted frame instead of filtering (column 7, lines 20-28). The filtering approach does not suggest deciding whether to filter at each pixel, rather Ueno column 7, lines 16-17 compares the "motion compensation prediction error" with a threshold, which should mean the prediction error of the block. That is, if Ueno filters, Ueno filters the entire block.

Consequently, Ueno does not suggest the claims.

Rule 41.37(c)(1)(viii) Claims appendix

1. A method of preprocessing for motion-compensated video encoding, comprising:

(a) providing a frame in a video sequence for motion-compensated encoding;

(b) for a pixel in said frame, comparing a difference between (i) the value of said pixel and (ii) the predicted value of said pixel from motion compensation prediction of said frame to a first level;

(c) when said comparing of step (b) indicates said difference is greater than said first level, apply lowpass filtering to said pixel; and

(d) repeating steps (b)-(c) for other pixels of said frame;

(e) motion-compensated encoding of said frame after said filtering.

2. The method of claim 1, wherein:

(a) said filtering of step (c) of claim 1 is filtering is both spatial in said frame and temporal over other frames of said video sequence.

Rule 41.37(c)(1)(ix) Evidence appendix

n/a

Rule 41.37(c)(1)(x) Related proceedings appendix

n/a